

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A blood cleansing system comprising: a source of dialysate fluid; a heating control module which receives dialysate fluid from said source and produces heated dialysate fluid; a first dialyzer including a first semi-permeable membrane that defines a first blood compartment and a first dialysate compartment, the first blood compartment having a first blood inlet which receives blood to be cleaned and a first blood outlet which expels partially cleansed blood, and a the first dialysate compartment having a first dialysate inlet and a first dialysate outlet, said first dialysate inlet for receiving said heated dialysate; and a second dialyzer including a second semi-permeable membrane defining a second blood compartment and a second dialysate compartment, the second blood compartment having a second blood inlet which receives a fluid including at least said partially cleansed blood and a second blood outlet which expels cleaned blood, and a the second dialysate compartment having a second dialysate inlet and a second dialysate outlet, said second dialysate inlet for receiving dialysate from said source at a temperature lower than a temperature of said heated dialysate that is delivered to the first dialysate inlet.
2. (Original) A system according to claim 1, wherein said source of dialysate fluid is fluidly connected to said second dialysate inlet and said heating control module so that dialysate fluid at said lower temperature is delivered to said second dialysate inlet and dialysate fluid delivered to said heating control module is heated prior to delivery to said first dialysate inlet.

3. (Original) A system according to claim 1, further comprising: a mixing chamber which receives said dialysate at an elevated temperature from said heating control module and said lower temperature dialysate from said second dialysate outlet to form said heated dialysate, said heated dialysate being delivered to said first dialysate inlet and having a temperature greater than a temperature of said dialysate from said source.
4. (Original) A system according to claim 1, wherein said blood in said first blood compartment has a first temperature and said blood in said second blood compartment has a second temperature, said first temperature being greater than said second temperature.
5. (Original) A system according to claim 4, wherein said blood enters said first blood compartment with a temperature less than said first temperature and is heated to said first temperature because of the presence of said heated dialysate fluid within said first dialyzer.
6. (Original) A system according to claim 3, wherein said heated dialysate has a temperature greater than about 40.degree. C.
7. (Original) A system according to claim 1, wherein said fluid comprises said at least partially cleansed blood and substitution fluid.
8. (Original) A system according to claim 1, wherein said partially cleansed blood has a first temperature which is greater than a second temperature of said cleaned blood when said cleaned blood exits said second dialyzer.
9. (Original) A system according to claim 1, wherein said dialysate is heated by one of adding a secondary fluid at an elevated temperature to said dialysate and passing said dialysate through a heating element disposed in said module.

10. (Original) A system according to claim 1, further comprising: a sterile substitution assembly for mixing sterile substitution fluid with said partially cleansed blood exiting said first dialyzer to form a blood/substitution fluid mixture which is then introduced into said second dialyzer through said second blood inlet.
11. (Currently Amended) A blood cleansing system comprising: a source of dialysate fluid; a heating control module for producing heated dialysate fluid; a first dialyzer including a first semi-permeable membrane defining a first blood compartment and a first dialysate compartment, the first blood compartment having a first blood inlet which receives blood to be cleaned and a first blood outlet which expels partially cleansed blood, and a the first dialysate compartment having a first dialysate inlet and a first dialysate outlet, said dialysate inlet for receiving said heated dialysate; a second dialyzer including a second semi-permeable membrane defining a second blood compartment and a second dialysate compartment, the second blood compartment having a second blood inlet which receives a fluid including at least said partially cleansed blood and a second blood outlet which expels cleaned blood, and a the second dialysate compartment having a second dialysate inlet and a second dialysate outlet, said second dialysate inlet for receiving dialysate at a temperature lower than a temperature of said heated dialysate; and wherein said source of dialysate fluid is connected to said second dialysate inlet for delivering said dialysate thereto, said heating control module being connected to said second dialysate outlet and said first dialysate inlet so that said dialysate flows from said second dialysate outlet to said heating control module where it is heated to form said heated dialysate which is then delivered to said first dialysate inlet.

12. (Currently Amended) A method of cleaning blood, the method comprising: providing a source of dialysate fluid; providing a first dialyzer including a first semi-permeable membrane defining a first blood compartment and a first dialysate compartment, the first blood compartment having a first blood inlet and a first blood outlet ~~and a~~, the first dialysate compartment having a first dialysate inlet and a first dialysate outlet; providing a second dialyzer including a second semi-permeable membrane defining a second blood compartment and a second dialysate compartment, the second blood compartment having a second blood inlet and a second blood outlet ~~and a~~, the second dialysate compartment having a second dialysate inlet and a second dialysate outlet; heating at least a portion of said dialysate from said source to produce heated dialysate which is delivered to said first dialysate inlet; delivering dialysate from said source to said second dialysate inlet at a temperature lower than a temperature of said heated dialysate; providing a blood inflow to said first blood inlet; dialyzing said blood inflow in said first dialyzer to provide partially cleaned blood which is delivered to said second blood inlet of said second dialyzer; dialyzing said partially cleansed blood in said second dialyzer to produce cleaned blood; said partially cleansed blood entering said second dialyzer through said second blood inlet, said cleaned blood exiting said second dialyzer through said second dialysate outlet.
13. (Original) A method according to claim 12, further comprising: diafiltering said blood inflow in said first dialyzer to provide partially diafiltered blood which is delivered to said second blood inlet of said second dialyzer; and diafiltering said partially diafiltered blood in said second dialyzer to produce cleaned blood.

14. (Original) A method according to claim 12, wherein heating said dialysate comprises: passing said dialysate through a heating element disposed in a heating control module.
15. (Original) A method according to claim 12, wherein said dialysate is heated to a temperature greater than about 40.degree. C.
16. (Original) A method according to claim 12, wherein said blood inflow is dialyzed in said first dialyzer at a first temperature greater than a starting temperature of said blood inflow prior to entering said first blood inlet, said partially cleansed blood being dialyzed in said second dialyzer at a temperature substantially equal to said starting temperature.
17. (Original) A method according to claim 12, wherein said dialysate is heated to a temperature which is sufficient to cause a temperature of said blood inflow to increase so that an increase in solute diffusivity and a corresponding increase in removal of blood substances by diffusion is realized during said dialysis of said blood in said first and second dialyzers.
18. (Original) A method according to claim 13, wherein said dialysate is heated to a temperature which is sufficient to cause a temperature of said blood inflow to increase so that enhanced convection, due to higher filtration of lower viscosity plasma water, is realized during said diafiltration in said first and second dialyzers.
19. (Original) A method according to claim 12, further comprising: mixing said dialysate fluid from said second dialysate outlet with said heated dialysate to form a mixed dialysate fluid having an elevated temperature relative to said temperature of said dialysate source; and introducing said mixed dialysate fluid into said first dialysate inlet.

20. (Original) A method according to claim 12, further comprising:
mixing sterile substitution fluid with said partially cleansed blood exiting
said first dialyzer to form a blood/substitution fluid mixture which is then
introduced into the second dialyzer through said second blood inlet.
21. (Original) A method according to claim 12, wherein said source
of dialysate fluid is connected to said second dialysate inlet, said
dialysate flowing from said second dialysate outlet to a heating control
module where said dialysate is heated to produce said heated dialysate
which is then delivered to said first dialysate inlet.
22. (Original) A method according to claim 12, further comprising:
delivering a portion of said dialysate from said source to said second
dialysate inlet; and diverting a portion of said dialysate to a heating
control module which heats said dialysate to produce said heated
dialysate.
23. (Currently Amended) A method of cleansing blood, the
method comprising: supplying a source of dialysate fluid and a blood
inflow; diafiltering said blood inflow in a first dialyzer to provide
partially diafiltered blood, said first dialyzer including a first semi-
permeable membrane defining a first blood compartment and a first
dialysate compartment. the first blood compartment having a first blood
inlet receiving said blood inflow and a first blood outlet ~~and a~~ , the first
dialysate compartment having a first dialysate inlet and a first dialysate
outlet, said dialysate in said first dialysate compartment having a first
elevated temperature so that said blood inflow is diafiltered at an elevated
temperature; and diafiltering said partially diafiltered blood in a second
dialyzer to provide cleansed blood, said second dialyzer including a
second semi-permeable membrane defining a second blood compartment

and a second dialysate compartment, the second blood compartment having a second blood inlet receiving said partially diafiltered blood and a second blood outlet ~~and a~~ , the second dialysate compartment having a second dialysate inlet and a second dialysate outlet, said dialysate in said second dialysate compartment having a second temperature less than said first temperature, said cleansed blood having a temperature which is less than said elevated temperature of said partially diafiltered blood.

24. (Original) A method according to claim 23, wherein said diafiltering of said blood inflow comprises: diffusing a portion of said blood inflow by a first countercurrent of said dialysate having said elevated temperature and in diffusion communication with said blood inflow, and wherein said diafiltering said partially diafiltered blood comprises diffusing a portion of said partially diafiltered blood by a second countercurrent of said dialysate of said second temperature and in diffusion communication with said partially diafiltered blood.